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Hurricane Agnes late in June engendered the worst floods the East Coast has seen in this century. The storm was not avoidable; its disastrous consequences, for the most part, were.

When headlines about flood damage and lives lost became less frequent, attention turned to those areas that suffered little from Agnes, though right in her way. Most of these were areas protected by watershed project measures, including dams and channel work. SCS Administrator Kenneth Grant, in this issue of SOIL CONSERVATION, discusses "channelization" with Hubert Kelley. And James Canterberry, in his article, tells us that farmers in eastern North Carolina approve wholeheartedly of channel work. The featured article on Agnes pinpoints the areas where SCS-assisted projects helped in preventing floods, property damage, and probably loss of life. Other articles point to the "extra" benefits that watershed projects can bring.

COVER: Lake Thunderhead, 3 miles from Unionville, Missouri, provides many scenic areas for camping.

Prepared in the Division of Information, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

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the role of channels in total water management

An interview with Kenneth E. Grant, Administrator, Soil Conservation Service

The Soil Conservation Service is responsible for administering annually a $150 million water resource program, including river basin and watershed planning and watershed and flood prevention operations. Because of the size and importance of this program and because one aspect of the program (channel work) recently has received a disproportionate amount of attention, SCS Information Director Hubert Kelley conducted the following interview with SCS Administrator Kenneth E. Grant. Administrator Grant reviews the current situation regarding channel improvement work in the SCS water resource program.

Question: Mr. Grant, no aspect of SCS work in recent years has created as much public controversy as has so-called "channelization" work in the small watershed program. Why is channel work so important?

Grant: Too often, channelization has been treated by its critics as if it were a total program. It isn't. Channelization is just one ingredient of water management in a small watershed project—and not every project at that. It is a way of moving water, whether you do it through a man-made channel, like a previously dug ditch, or through a natural streambed, so that it can be disposed of safely.

Question: Can you design a watershed project so that it doesn't require channel work?

Grant: That depends on the topography and other features of the watershed. Every project area is different; there is usually no pat solution to a problem you are trying to alleviate. Nearly one-third of the watershed projects approved for operations so far involve no channel work. In some parts of the country, however, the land is so flat that you can't impound water. In places like that, you have to depend on a channel to carry off excess storm water. You insist on good soil and water practices, but you also

have to have a channel as a central part of that watershed.

In other projects, a channel is just one part of a comprehensive plan—a plan that includes land treatment, like turning cropland on hillsides into pasture; impoundments to hold storm water; and, finally, a channel to move the water safely away after the storm is over.

You have to treat each project individually.

Question: A few critics have charged that SCS plans to channelize some 150,000 miles of natural, perennial streams in the United States. Any truth to this?

Grant: None at all. That figure has no basis in fact.

Question: Is most channel work concentrated in one part of the nation, or is it a widespread practice?

Grant: About 70 percent of the channel work planned or completed is in the South Atlantic and Gulf Coast states. No channel work at all has been planned in four states. And there are 15 more states that each

"All our contracts contain stringent provisions for controlling soil erosion during construction. Some clearing can't be avoided, but we do our best to get the area vegetated again as soon as possible."

have less than 50 miles of planned channel work.

Question: The public has heard a lot about how bad channelization is. What are some of the benefits of channel work?

Grant: One benefit is that you get excess water off agricultural lands—and other lands, for that matter. If you kept 3 feet of water out of your living room during Hurricane Agnes, I'd call that a benefit, wouldn't you? Another benefit is that we get water into channels to achieve more efficient water management on the farm. And we move water out so that it doesn't damage roads or recreational facilities or business firms. The purpose of a channel, as in all flood prevention work, is to make sure we manage the water all the way through a watershed to alleviate as much flood damage as possible.

Question: What about charges that clearing the banks on each side of a channel causes erosion and creates ugliness?

Grant: In many cases, we require contractors to fertilize and reseed banks almost daily. They also plant shrubs and trees as soon as possible to create new wildlife habitat. All our contracts contain stringent provisions for controlling soil erosion during construction. Some clearing can't be avoided, but we do our best to get the area vegetated again as soon as possible.

Question: Some critics insist that there are practical alternatives to channelization. Are we giving these alternatives proper consideration?

Grant: Again, it depends on the watershed. What we are trying to do is get as many people involved in the watershed planning process as we possibly can so that all the alternatives can be explored thoroughly. One alternative may be to build more impoundment structures or delay the release of water from impoundments so that it moves into channels very slowly. Another alternative is to dig only on one side of a channel, leaving the bank and vegetation intact on the other side. Or we can build pools and riffles in the stream to protect the fishery resource. Planners need to explore all the alternatives, and we insist that they do.

Question: But many environmentalists claim that, at best, channel work is terribly destructive to many of our beautiful, natural streams. How valid is this criticism?

Grant: A lot of these people don't understand the process of channelization very well. Some of the criticism has contained more emotion than reason. Actually, all the channel work completed in Public Law 566 projects to date involves less than 8,000 miles. Most of this mileage consists of man-made ditches or streams that only flow during part of the year. Only 18 percent—or about 1,400 miles—involves natural streams that flow all year long. Compare this small mileage to the estimated 3½ million miles of streams in this country and you can see that SCS channel work takes place on a very small percentage.

And you certainly couldn't call some of the natural streams we work on "beautiful," at least not in the way I define that term. Many of them are clogged with sediment, fallen trees and branches, all kinds of debris. Streams like that have lost their capacity to carry water away, and you have to restore or enlarge their channels if you want to prevent floods.

Question: But doesn't channelization do irreparable harm to the fish that live in those streams?

Grant: On those streams that flow only part of the year, the fishery resource wasn't there in the first place. On the natural streams, you have to look at each project on an individual basis. I know from personal experience of examples where channel improvements have been followed within a short time by a marked improvement in the fishery resource. In these places, fishing turned out to be better after channelization than it was before. You can't generalize about a thing like that.

Question: But I assume you are saying that in other instances, channel work has damaged the fishery resource.

Grant: In some places, yes—particularly on a short term basis. The long run may be quite different. In light of our experience with some 1,000 watershed plans to date, I think we have learned to examine every stream and look at all the environmental values involved before we begin work. Then, if the planners decide that a particular stream should not be touched, because of the fish and wildlife values, that may very well be the right answer for that particular project. In another instance, planners may find that the right kind of channel work can be accomplished, while protecting

"And you certainly couldn't call some of the natural streams we work on 'beautiful'. . . . Many of them are clogged with sediment, fallen trees and branches, all kinds of debris."

the fishery resource or even enhancing it. Then we can proceed with channel work.

Question: I gather that you are saying that channelization shouldn't be branded as good or bad, per se.

Grant: That's exactly what I am saying. To generalize that every time you enlarge or modify a channel you wreck a stream is a simplistic approach that doesn't jibe with the facts.

Question: What about criticism that the Public Law 566 program brings unneeded cropland into production?

Grant: The truth is that in projects completed so far, there has been a net decrease in land used for row crops. Many farmers have shifted crop production from hillside acreage, where the danger of erosion is very high, to other acreage suited to crop production where you can control erosion. The small watershed program is a conservation program, not a land reclamation program.

Question: Has SCS made any changes in its approach to channelization since the wave of criticism against the practice began a few years ago?

Grant: Since passage of the National Environmental Policy Act of 1969, of course, we have been filing environmental impact statements on each new watershed project. Now we also are filing statements on some of the projects approved before the act became effective if they appear to be controversial. Also, we have reviewed all proposed channel work and have dropped or altered plans where the work might threaten fish and wildlife resources. So there definitely have been changes in our approach to reflect the heightened concern over environmental values.

Question: Some criticism of channel work has come from environmental groups that are fairly new on the scene. How do you feel about these newcomers to conservation?

Grant: Personally, I welcome the recent growing concern among so many citizens over the condition of our environment. The Soil Conservation Service has been concerned about the environment ever since it began operations in 1935 during the Dust Bowl days. Our agency today welcomes the opportunity to work with these new environmentalists and to share experience and points of view. The result, I believe, will be to make the soil and water conservation program even more important environmentally to the people of this country.

Question: In your opinion, how can we clear the air and arrive at some sound thinking about channelization? How can we take the emotion out of the controversy?

Grant: If all the people concerned with the resources in a watershed would participate in the planning process—rather than sitting as judges later on—I am convinced they could arrive at reasonable solutions that will help them to reach most of their objectives. I think they can find ways to protect fish and wildlife and to reduce the frequency of flooding. That's the real challenge: to get federal and state agencies and local people working together to come up with the best possible plan after considering all the alternatives that are available. That's really what watershed planning is all about. ♦

Channelization —the farmer's friend

by James H. Canterberry
Area conservationist, SCS
Edenton, North Carolina

Mention channelization or stream-channel improvement today and you can get involved in a controversial subject.

Some conservationists and ecology groups have called channel work "environmental destruction," but people in eastern North Carolina, who are also concerned about the environment, have quite a different viewpoint on channelization.

Channelization is nothing new on the flat coastal plains of North Carolina. To most farmers and townspeople channel work has long been necessary to drain the low-lying land, thus making farming possible and providing some protection from floods.

Channelization also is the only way to restore some natural streams. Roy Hollowell of Bertie County in eastern North Carolina, whose farm is in the Ahoskie Creek watershed, recalls: "As a boy, I remember a natural stream on our place that had several good fishing holes. They never went dry. Today that stream hardly resembles a stream—it has filled in with sediment and tree tops."

A notable example of early channel improvement work is the Dismal Swamp Canal. George Washington began planning the canal in 1763. Construction began in 1790 as a joint effort between North Carolina and Virginia. The canal was designed to

Channel work was performed 6 years ago on this stream (above) in the Conetoe Creek watershed. Ozell Sessons (left), a farmer in the Ahoskie Creek watershed, believes that channelization has offered him a chance to make a better living.

Edgecombe County leaders view a section of restored Ballahack Canal. Grass has grown along one bank, and trees and other vegetation are abundant on the opposite bank; the water flows freely.

provide water transportation between Albemarle Sound and Chesapeake Bay, but it also provided useful outlets for farm drainage systems.

Agriculture is the oldest and most important industry in eastern North Carolina. Pioneers on Roanoke Island probably were cultivating the soils in 1585. For them channel improvement was not necessary—the farming was on too small a scale.

But soon after the clearing of large areas and the introduction of the plow to the soil, natural streams began to change. Hundreds of small streams that had flowed free and clear were choking with sediment and flood-borne debris. Farmers found it necessary to clean out and improve the channels.

In modern times, channelization concerns both economics and a way of life. Ozell Sessons, a farmer in the Ahoskie Creek watershed, puts it this way: "Channelization offers me an opportunity to improve my economic level. At the same time, well-planned channels can improve fish and wildlife habitat."

To Mrs. Katie Weatherly, domestic aspects come first. She says, "To a woman, the channel work that brought us protection from floods means no more mud and dirt in the house. No more green slime in the shrubbery and flowers. Without the watershed project we would have had to wade from the house to the road for at least a month."

She was referring to the Gum Neck Watershed Project in Tyrrell County. Project measures protected many farmers and landowners from floods in September 1971, when Hurricane Ginger dumped torrents of water on eastern North Carolina.

W. B. White, a farmer in the Pollock Swamp watershed in Chowan County and a commissioner of his drainage district, insists that channel work is necessary in most of the coastal plains area if farmers are to exist. "In my opinion," he says, "the logical approach is through Public Law 566—the Small Watershed Program. It provides total watershed development, including land treatment vital to reducing soil erosion—and we all know sediment is a menace to our streams."

Coastal plains farmers, deeply interested in their environment, do not understand the vehement opposition to channelization. Maybe because they know what it's like farming their land without the benefits of this water management practice. ♦

Kentucky city generates prosperity with water

by Gordon S. Smith
Public information specialist, SCS
Upper Darby, Pennsylvania

Twenty years ago Elizabethtown, Kentucky, was a quiet rural community. Farming the fertile hills was the main concern of most of its 5,800 residents.

Today, little E-town has lost that small-town look; it is a prosperous, fast-growing city. Economists are predicting it may someday compete with neighboring Louisville as one of the largest metropolitan centers in the area.

"This prediction is understandable when you know the basic reasons for our growth," says James R. Pritchard, mayor of Elizabethtown. "Two major interstate highways meet at the edge of the city. Open land is available for city expansion. Even more important, we now have a water resource that exceeds our current municipal, industrial, and recreational needs."

E-town's future hasn't always looked this bright. A few years ago, its water resource—the foundation for current hopes—was the chief deterrent to the city's growth.

Floodwater from Valley Creek and its tributaries was a frequent and costly hazard for both city and rural people. In May 1961, for example, floodwater damaged 148 homes, 54 businesses, two railroads, an interstate highway, and many farms, roads, and bridges.

Hundreds of people had to evacuate their homes. Transportation was disrupted and businesses closed. No lives were lost, but property losses within the city limits reached $155,000, and similar losses were registered in the farming areas outside the city.

Average annual city flood damages had been $42,000. Moreover, 43 full-time farmers suffered an average loss of $120 each year, adding $5,200 to the community's total annual loss from high waters.

Limited municipal water supplies represented Elizabethtown's expansion bottleneck. While the city had not yet experienced any real water shortages, increases in population were straining her supply, which came from two springs and a single deep well.

Recreational resources had reached a critical stage as well. The city had some small parks, but the nearest water-based recreation was 40 miles away.

In an all-out effort to solve these problems, the city of Elizabethtown, then under the leadership of Mayor Leonard J. Bean, joined with the Hardin County Soil Conservation District in sponsoring a watershed-protection project under the Federal Watershed Protection and Flood Prevention Program (Public Law 566).

The project plan, worked out with SCS technical assistance and approved by the Congress in April 1964, combined land treatment and floodwater dams in the 58,000-acre Valley Creek watershed to reduce flooding and harness water for municipal and recreational uses.

Soil-protection measures were installed by individual landowners with technical help from SCS and the Forest Service. Grassed waterways, stripcropping, tree planting, mulching, and other conservation measures were used throughout the watershed to reduce soil erosion and abate the flow of channel-clogging silt into the streams.

Three earthfill dams were planned as single-purpose struc-

Where do you want your water? In the streets . . .

tures—to hold back floodwater for safe, slow release after a storm. A fourth dam, a multiple-purpose structure, would both hold back floodwater and form a storage area for 300 million gallons of water for municipal and industrial uses in Elizabethtown. In addition, a 43-acre public park along one side of this 160-acre lake, with facilities for fishing, picnicking, and boating, would provide recreation for local people.

The Hardin County Fiscal Court's participation in the project was typical of the thoroughness of local cooperation. The court approved an allocation of $45,000 for the project when construction was slowed by a lack of local funds to pay for easements and land rights.

Even during construction, Elizabethtown residents had opportunities to see the advantage of a watershed project. Severe rainstorms hit the area when only two of the four planned dams had been finished. Nevertheless, floodwater did not enter the downtown business area. In the past, similar rains had severely flooded the town.

Unfortunately, several houses near a tributary in an area not then protected by dams were flooded during these storms.

More than 70 percent of the proposed land-treatment work was finished or nearly finished when dam construction began. Of the 454 farms in the watershed, about 400 were cooperating with the conservation district.

By the end of 1971, E-town residents saw other tangible results of their 7 years' work. The multipurpose dam was complete, and behind it, the 160-acre, 1¼-mile long Freeman Lake was filling up with millions of gallons of water for municipal, industrial, and recreational use.

The Freeman Lake Recreation Area was also ready. Today, a hard-surfaced road curves its way from the highway to a 100-car parking area. Lush grass and woods cover the 43-acre shoreline picnic area. For the future, 58 acres remain available for recreational development. Picnic shelters, stone fireplaces, drinking fountains, and restrooms dot the area. A caretaker's house is

or in a multiple-purpose lake.

nearby. Admission to the area is free. Fishing costs $1 a day or $5 a season. Row boats and pedal boats are rentable.

The Lincoln Heritage House, built 160 years ago, stands just above the new lake in the midst of the recreation area. Abe Lincoln's father, Hardin Thomas Lincoln, did the "joiners work" on the building. E-town recently raised $18,000 to match a federal grant to have the house restored.

A $795,000 municipal water-filtering plant was built in 1971 just below Freeman Lake. This facility uses the latest purification equipment and can process more than 3 million gallons of water a day.

"We had been buying 300,000 gallons of water a month from the county before this new plant went into operation," comments Mayor Pritchard. "Now the county will be buying water from us."

Elizabethtown is benefiting in other ways from its augmented water supply. Areas kept out of development because of insufficient water pressure can now be used for housing or industry. Four companies have built new plants in Elizabethtown. Fourteen other companies, already located there, have invested more than $18 million in expanded facilities. This expansion and the new industry have created about 2,500 new jobs.

"This growth means much larger payrolls—and a larger tax base for the city, which in turn means more money for schools and swimming pools and better roads and bridges," says Mayor Pritchard.

To cope with an expanding economy, the city is gradually annexing new land. In 1971, 4,500 acres were added to E-town, doubling its size.

The final cost of the project, as of its dedication October 4, 1971, was $2,803,560. The city's part amounted to $672,080, of which the county paid $45,000. Federal funds paid the remainder. Economists estimate $2.50 in benefits to Elizabethtown for every $1 spent on the project.

Water is making E-town prosperous. ♦

When Hurricane Agnes reigned—and rained

Dams like this in Wellsboro, Pa., spared many communities from serious flood damage.

Hurricane Agnes—one of the most ravaging storms ever to hit the United States—blew in and out last June, leaving death and destruction in its violent wake.

At least 118 people died, more than 220,000 had to be evacuated, thousands of homes were destroyed, and damage estimates ran into the billions. Robert M. White, head of the National Oceanic and Atmospheric Administration, called the flooding "the most extensive in the country's history."

What Agnes did *not* destroy, however, were the hundreds of dams in small watershed flood control projects located in the hurricane's stormy path.

The dams, designed and built with the help of the Soil Conservation Service, were severely tested by the heavy rainstorms.

Not one of the dams failed under even the most severe conditions. Not one came close to failure. A conservative estimate of the damages they directly prevented, say SCS officials, is $22 million.

Reports on the SCS-designed dams came from all over the Middle Atlantic states.

In suburban Montgomery County, Md., where the storm was of 100-year intensity, Lake Needwood and Lake Frank protected thousands of people downstream. SCS District Conservationist Lewis Williams estimated that the depth of floodwaters in many areas below the lakes was reduced one-third to one-half because of the lakes, which are part of the Upper Rock Creek Watershed Project.

Williams noted that "the serious flooding that did take place further down along Rock Creek could have been greatly reduced through small watershed-type protection; however, the area is now intensively urbanized and most potential damsites were pre-empted years ago."

In Pennsylvania, Agnes affected all of the state's 67 counties, and brought a flood damage bill exceeding $2 billion. But towns like Hamburg, East Berwick, Westfield, New Ringgold, and Tamaqua escaped the brunt of the hurricane because small watershed projects were on the job.

The new (1971) multiple-purpose dam in the Mauch Chunk Creek Watershed Project saved the borough of Jim Thorpe, Pa., from more than $1 million in flood damages. A dam for all reasons, it also provides water supplies and a 350-acre recreation lake for the community.

In Wellsboro, Pa., a happy Mayor William Hall reported that his town stayed dry, and avoided an estimated $10 million in flood damages, through the Marsh Creek Watershed Project.

In contrast, nearby areas without protection had severe problems. Wrote a local reporter: "Residents of the Wellsboro region will never believe what happened to their neighbors in the Tioga River valley unless they see it for themselves. The reason is that the borough and surrounding area escaped untouched by the flooding and destruction that ravaged towns and villages less than 20 miles to the east.

"Upwards of 10 inches (of rain) fell in a 36-hour period . . . but the three main creeks that drain a large watershed above town remained in their banks."

SCS District Conservationist Donald Lindsey estimates that the Marsh Creek dams held back nearly 680 million gallons of water at the height of the storm. He noted that June 26—2 days after the storm—was the date for all work on the project to be accepted by county and SCS officials.

"These dams promptly paid for themselves several times over," said Lindsey, "and they even did it 2 days in advance!"

The southern part of New York state was also slammed by the hurricane. Dams in several watershed projects near the town of Binghamton did their job. Farmer Warren Zimmer of Broome County said of the dams in the Nanticoke Creek Watershed Project, "I think they saved us." The Ischua Creek Watershed Project near Franklinville prevented millions of gallons of floodwaters from rolling down into

the town. The Deer Creek Pilot Watershed Project in Tioga County, N.Y., protected that area. And the Conewango Creek Watershed Project's five completed or partially completed dams in Cattaraugus and Chautaqua Counties held back more than 446 million gallons of water and averted considerable damage.

Raymond Brown, Jr., SCS district conservationist in Cattaraugus County, cited a nursing home in Randolph, N.Y., as one example of flood protection to local citizens. "In 1967," he said, "a rainstorm of 4.72 inches forced elderly patients and the staff to evacuate the home. But during Agnes, when more than 6½ inches fell in the area, the patients were never threatened with evacuation. Dam 19 on Dattle Creek made the difference."

Brown points out that watershed projects protect fish and animals as well as people, noting that "the floodwaters and sediment smeared around on unprotected flood plains really got to the fish and wildlife. They need flood protection too."

In Delaware, farmers—already hard hit by heavy rains before Agnes—suffered severe crop losses. Jack Webb, who farms near the Upper Choptank River Watershed Project, said, "I have land improved by the watershed work, and I also have unimproved land. In the improved area, my drainage saved me $4,500 on one farm alone. Where I didn't have drainage improvements because outlets weren't provided, I lost 90 acres of crops."

And another farmer, Isaac Thomas of Marydel, Del., said, "We had more than 8 inches of rain from Agnes. Without recent improvements . . . we could have had a 50 percent loss on all crops."

In Virginia, the savagery of Hurricane Agnes left at least 22 persons dead and damages estimated in excess of $150 million.

The intense rainstorms reached a possible 200-year frequency in parts of Fairfax County, Va., near Washington, D.C. The Pohick Creek area in Fairfax had 11 inches in one 24-hour period. Lake Braddock, the first of the Pohick Creek Watershed Project's dam-created lakes, safely held back more than 150 acre-feet of water.

Charles Koch, district executive of the area's soil and water conservation district, explained that "what the lake did was to hold back the water and let it down slowly, so that, instead of water from a 100- or 200-year storm being added to the main stem of the Pohick, it was about like water from a 5-year storm—and that's a big difference!"

NBC-TV news people on a "washed" wheatfield in Pennsylvania.

"No wonder," said Koch, "that this has stirred a lot of interest in watershed projects elsewhere in Fairfax—a suburban county of almost half a million people."

In rural Prince Edward County, Va., dams in the Buffalo Creek Watershed Project prevented corn and soybean losses below the structures while crops in nearby unprotected areas were destroyed.

The Roanoke Creek Watershed Project in Charlotte County, Va., had 13 dams and about 20 miles of stream channel improvements fighting the flood and helping to keep water levels low. Where there are no flood-prevention structures or channel improvements to offer protection, high water closed roads and highways at 32 locations in the county.

The South River subwatershed project in Augusta County, Va., did its planned job of flood control on rural land and also gave the city of Waynesboro (population 17,000) about 25 percent flood protection, according to District Conservationist Wayne Hypes.

Hypes noted that Waynesboro had flood damages—"water up to the doorknobs in some places"—but without partial protection, the waters would have risen much higher.

"This flood has renewed local interest in getting the land rights for five more small dams in the area," he said. "With these in place, cityside protection would be almost 50 percent."

SCS District Conservationist David Poe of Culpeper County, Va., said that dams in the Mountain Run Watershed Project held back

Dozens of bridges were washed away, leaving many communities isolated.

1.8 billion gallons of water during Agnes. Unlike nearby Rapidan and Remington, which were inundated, the town of Culpeper received only minor flood damage—and that, said DC Poe, will be controlled by planned additions to the Mountain Run Project.

As Claude Huffman, Culpeper's town manager put it, "There's no question that without the dams, Hurricane Agnes would have flooded the town with at least 2 more feet of water."

Virginia State Conservationist David Grimwood took an overall look at land damages in his state from a helicopter. "One of the things that really sickened me," he said, "was to look down at clean-tilled land above the dams. Fields without stripcropping and waterways were badly rilled and gullied, and you could quickly spot the sediment runoff patterns. I don't think a lot of people realize how much everyday conservation work pays off in an emergency like this."

The rainstorms of Agnes brought tragedy to many people. Houses, crops, possessions were washed away.

The lesser known story, perhaps, is the number of personal and community tragedies reduced or prevented—and the lives very probably saved—because local people began working years before the storm to flood-proof their communities. They did it through good land use, flood-plain planning and zoning, and small watershed-type protection.

The rains came. The SCS-designed dams held.

The land treatment and channel work stayed on the job.

As SCS District Conservationist Wayne Hypes put it, "I'm really proud to be part of an organization and a group of people that can design and help to plan and build projects like these. They all came through in a crisis, just like the engineers said they would."—CURRENT INFORMATION BRANCH, *Information Division, SCS, Washington, D.C.* ♦

The estimated total cost of 161 floodwater-retarding dams and 150 miles of channel improvement work in the Hurricane Agnes disaster area is more than $38 million. This cost, including payment for land rights, is based on average cost rates for such structures and work in the Middle Atlantic region, as shown in the USDA Economic Research Service inventory of Public Law 566 watershed work plans approved in fiscal year 1971.

Of the 161 dams in the storm area, 127 are single purpose (flood prevention) and 34 are multiple purpose.

127 single-purpose dams at $107,600 each	=	$13,665,000
34 multiple-purpose dams at $583,300 each	=	$19,832,000
150 miles of channel work at $30,400 per mile	=	$ 4,560,000
	Total	$38,057,000

The estimated damages prevented by dams and channel work amounted to $22,206,000.

A dam in time saves and saves and saves

by John S. Taggart
District conservationist, SCS
Montpelier, Idaho

It was a good thing that the Montpelier Creek Reservoir was ready to store water in the spring of 1971. Without the 4,050-acre-foot storage capacity of the reservoir, the main street of Montpelier, Idaho, would have been under water from May 4 to the end of the month.

Periodic flooding in Montpelier and the surrounding farmlands has been a way of life since this southeastern Idaho community of 2,600 residents was first settled in 1863. The combination of damaging floods late in spring and the shortage of irrigation water in July and August was a real frustration to city dwellers, farmers, and ranchers.

The need for a dam on Montpelier Creek to store part of the otherwise lost spring runoff was recognized back in the early 1930's. A series of bad floods, starting in 1945 and recurring every 2 or 3 years, made it imperative that something be done.

In 1961, local people associated with the Montpelier Irrigation Company, the Bear Lake Soil and Water Conservation District, and the city of Montpelier requested the help of the Soil Conservation Service in putting together a small watershed project under authority of Public Law 566. The Montpelier Creek Watershed Project was the result.

The project was approved for construction in August 1964; construction began the following spring.

In addition to a multipurpose dam in Montpelier Creek canyon, the project included enlarging part of the irrigation company's canal system so it could serve as a bypass for floodwater from the watershed below the damsite.

Construction of a flood channel from the canal to the Bear River was also included, and the open channel of Montpelier Creek, which meandered through the community, was to be replaced with 54-inch reinforced concrete pipeline. This would eliminate the winter icing of the channel and the consequent overflow and flooding of the residential area adjacent to the creek. Modifying the irrigation company's delivery system was also included.

The dam was completed in the fall of 1970—and none too soon. The 1970-71 winter snowpack in the watershed was one of the heaviest in years.

Montpelier Creek began rising in mid-April and by May 4 had reached the point where flooding could have become a serious problem had it not been for the dam. The Montpelier Irrigation Company, following a carefully developed operations plan, controlled the release of water from the reservoir so that at no time during the 22 days of flood flow did the creek overflow.

James Olsen, mayor of Montpelier, stated that the dam and reservoir in its first season of operation saved the city thousands of dollars in flood damage.

Recognizing the infallibility of hindsight, Phil Derricott, president of the Montpelier Irrigation Company, and Owen Stephens, the company's director, reflect that the dam should have been built back in the WPA 1930's when one of the presently largest dam-construction companies in the world offered to build it for $80,000.

The dam cost $1,500,000, under today's prices, but it probably is a more sophisticated engineering structure.

Work on the structural measures of the watershed project was pretty well completed by 1971. The Montpelier area faced the future with confidence and optimism. The threat of flooding had been removed, and water for late-season irrigation was a sure thing. ♦

A sight like this hasn't been seen in Montpelier, Idaho, since 1971—that year a watershed project dam was ready to hold floodwaters back.

Sugar water

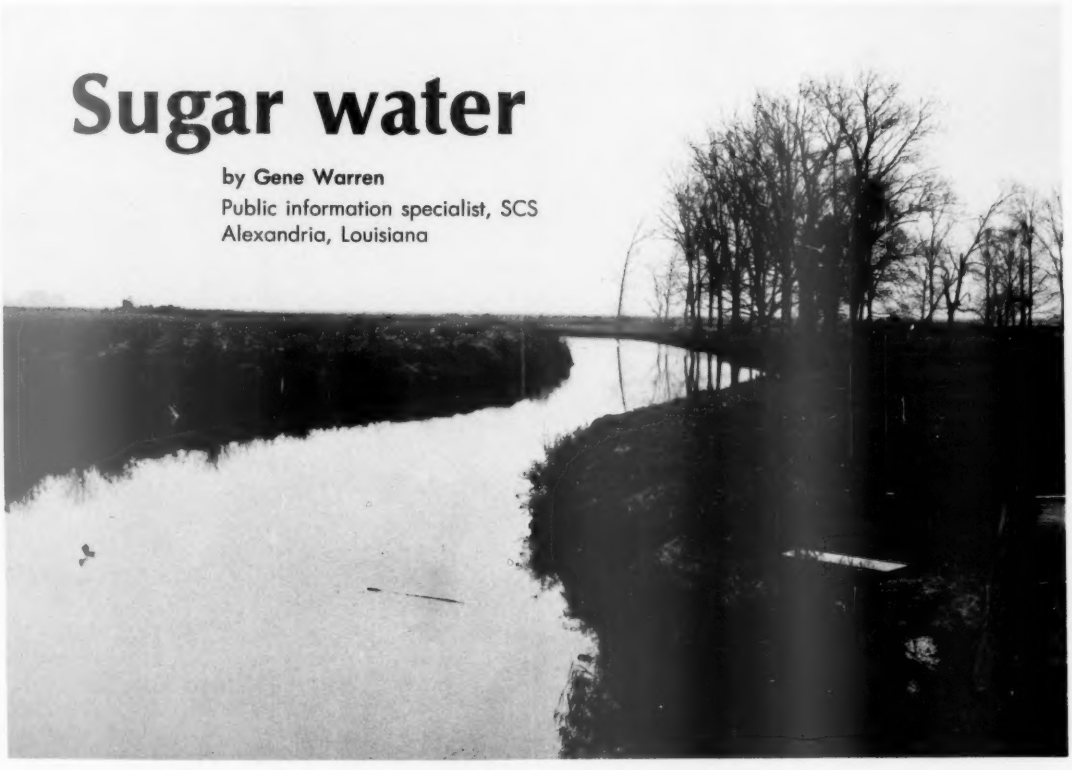
by **Gene Warren**
Public information specialist, SCS
Alexandria, Louisiana

People in the Lower Bayou Teche watershed, deep in the heart of the sugarcane country in southern Louisiana, say they like to live where there is abundant water. But they do something about it when there is too much.

The Lower Bayou Teche Watershed Project has made acres and acres of prime farmland safe from floods. And several towns in the 188,700-acre project area no longer are threatened by rising water in the streets.

This project has won national first-place honors for community development from the National Association of Counties. The many "side benefits" the project has brought to the area demonstrate its effectiveness.

Much of the marsh was unpro-

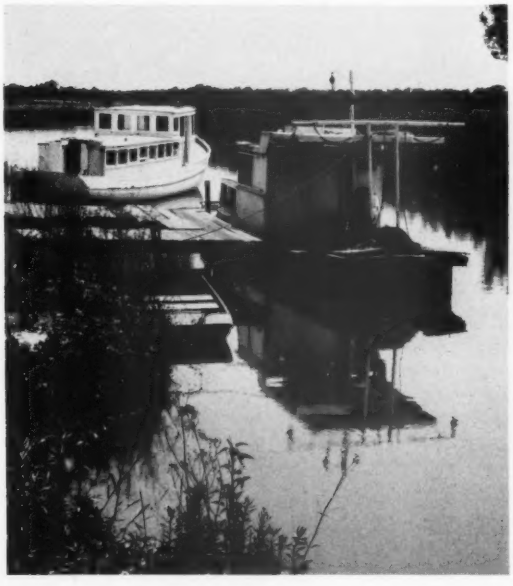


(Opposite page, top) The Lower Bayou Teche Watershed Project made acres and acres of sugarcane land safe from floods.
(Opposite page, bottom) In improving this drainage canal, the original crooks were retained and trees were left along the banks.
(Above) The improved drainage canals have made the land more productive.
(Below, left) Some canals were widened and deepened. Boats can now go down to the Gulf of Mexico.
(Below, right) Harvesting crawfish is a common sight now in the parish. Many landowners used spoil dirt from the canals to impound water for crawfish, ducks, and other wildlife.

ductive before the watershed project. Now people can hunt, fish, trap, and bird watch there.

Also, the canals, which were built to carry excess upland water through the marsh to outlets lower down, are deeper and wider now that silt and debris have been removed. Boats can travel up and down the waterways where they couldn't before.

Local people praise the Iberia-Vermilion Soil and Water Conservation District and the Iberia Parish Police Jury for sponsoring the project. And they speak well about the technical and financial help from the Soil Conservation Service and the Louisiana Department of Public Works. ♦



Paradise Valley, a land for people

by Sylvan T. Runkel
Biologist, SCS
Des Moines, Iowa

and Lynn A. Betts
Information specialist, SCS
Des Moines, Iowa

He had never camped, or caught a trout. His life was farming. Cattle roamed his woodlands, searching for good pasture. His barn held the sweet-smelling hay savored by his dairy herd.

That was Gene Schmelzer of rural Garnavillo, Iowa, 4 years ago.

Today, Schmelzer's hayloft has a juke box and pool tables. The milking parlor on the ground floor has been replaced by a laundry room and restrooms. And, instead of milking cows, the northeast Iowa farmer-turned-recreationist might be organizing a church service in the barn.

"No hunting" means all the visitors can enjoy the wildlife.

Schmelzer's land had a lot to do with his decision to change not only his occupation but his life style as well.

"Much of the land is Class VII, very steep," explains Roger Koster, SCS district conservationist at Elkader. "It shouldn't be pastured. It is ideal for hiking, horseback riding, and other forms of outdoor recreation."

Schmelzer, his wife, and two of their children have a full-time job keeping people happy at their 270-acre Paradise Valley.

"If you think farming is a family business, you should try a recreation business," Schmelzer says. "Each of us has principal duties, but we help one another, too. Our 10-year-old son, Kim, cleans the fish and helps with odd jobs. Carol Ann, who is 15, is trail boss. We've got 20 horses and a 6-mile trail."

Schmelzer's wife, Cecilia, manages their small store and is in charge of fish frys and barbecues. Schmelzer mows grass, fixes anything that's broken, trims trees, chops firewood, and keeps everything running smoothly.

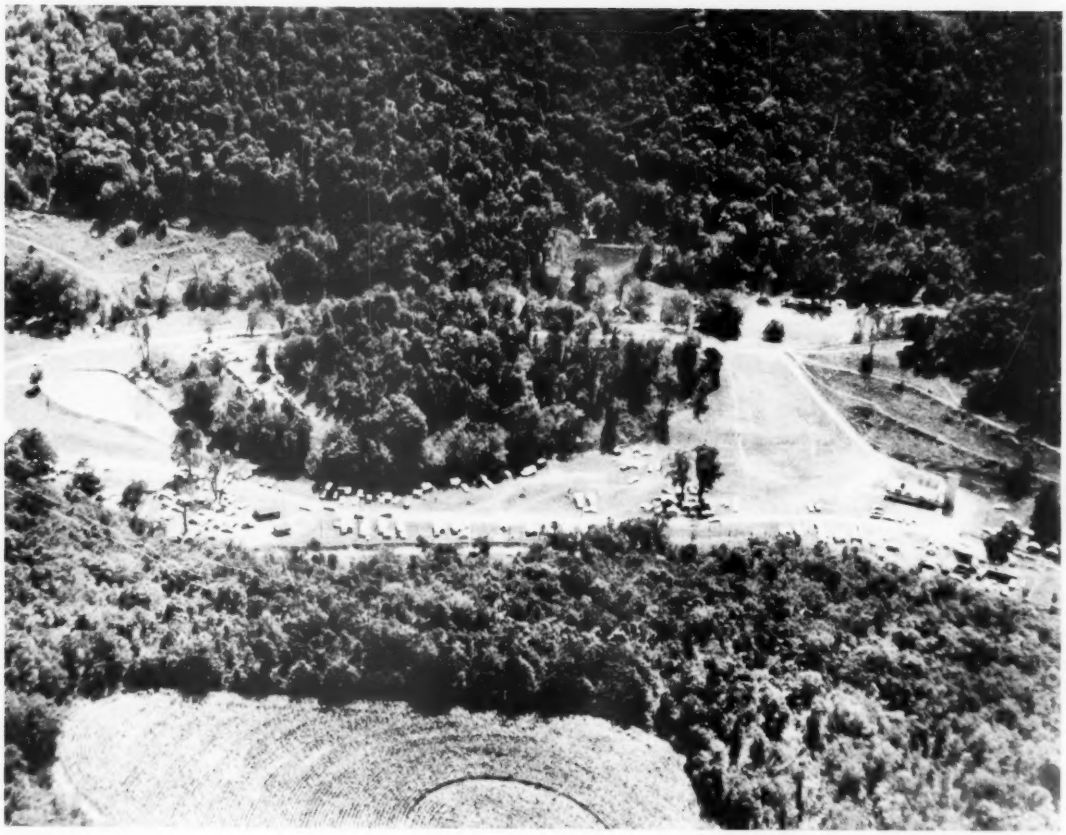
"I like it, but it's a lot harder work than farming," Schmelzer admits. "You've got to be here all the time; there's always someone riding a horse, fishing, or doing something. We've got horseback riding, fishing from two trout ponds, camping, hiking, paddleboating, swimming, and picnicking—outdoor activities people can do pretty much on their own. We organize group activities like hayrides when people ask for them."

Between 1,500 and 2,000 people came to Paradise Valley during the Labor Day weekend in 1971. Business tripled what it was the year before, and Schmelzer thinks it has been even better this year.

Is it difficult to convert to recreation from farming? "You start with nothing but ideas," says Schmelzer, "and you learn from mistakes. My biggest problem has been in thinking too small—right now I'm expanding shower and restroom facilities."

"This valley was nothing but a ditch and bull thistles when I let the milk cows have the run of the place," Schmelzer says. "It wasn't good pasture, nor good timber."

But it did have potential for recreation, according to Koster. The valley, only a half-mile from the Mississippi River, is one of several with fresh, pure drinking water from underground springs. The wooded hills are natural



This 270-acre recreation "farm" includes 180 acres of steep woodland that are better suited to recreation uses than to farming.

wildlife and recreation areas.

Koster is hopeful that other farmers will think about converting some of their land to recreation uses. "The beauty of northeast Iowa attracts a large number of tourists," he explains, "and Clayton County is in the Upper Explorerland RC&D Project area, which has tourism development as a primary objective. If people get together on that project, they can make quite a few recreation enterprises work."

Koster helped plan the conservation practices for Paradise Valley. They included shaping the ditches into waterways; revamping two old ponds to make them suitable for swimming, paddleboating, and trout fishing; and building three erosion control structures. A 2,750-foot diversion terrace had already been built to protect the barn.

Cost-sharing help for most of the practices was available from the Agricultural Stabilization and Conservation Service.

"Bill Ritter, a forester with the Iowa State Conservation Commission, has helped with tree plantings and has given me advice on woodland management," Schmelzer says.

"We don't allow hunting here, so we have squirrels, rabbits, deer, chipmunks, and other animals for campers to enjoy," he adds.

The riding trails probably will need reseeding periodically to prevent erosion, and there is still silt going into the valley's main stream. Talking to Gene Schmelzer, you get the idea these problems will be solved. He takes care of his land. ♦

Review

Books

Soil Conservation. By Norman Hudson. *1971. Cornell University Press (124 Roberts Place, Ithaca, New York 14850). 320 pp. $9.75.*

The varied and vast amount of technical information contained in this well-written book reflects well the expertise of the author. Norman Hudson has been an erosion-control researcher in Africa and a university lecturer in Africa and the United States. He is presently the head of the Department of Field Engineering and director of Studies in Soil Conservation at the National College of Agricultural Engineering in Silsoe, Bedfordshire, England.

Hudson's aim in writing the book is threefold: first, to provide a history and study of soil erosion and its treatment; second, to adapt world research and action methods of erosion control to developing countries that do not have highly capitalized and mechanized agricultural industry; and third, to combine agronomy and engineering methods into an integrated whole for use of students of agriculture, forestry, geography, geology, and ecology.

The author succeeds in his objectives. The book should be a useful reference for students, scientists, and technicians who are or will be working in developing countries.—R. C. Barnes, Jr., *agricultural engineer, SCS, Washington, D.C.*

Erosion and Sediment Pollution Control. By R. P. Beasley. *1972. Iowa State University Press (Press Building, Ames, Iowa 50010). 320 pp., illus. $11.95.*

The author states that the primary purpose of this book is "to help conservationists develop the ability to analyze a given situation, determine the practices necessary for effective erosion control, and put these practices into effect on the land." To do this, he presents information on hydrology, hydraulics, and surveying. The book is mainly for use as a textbook for agriculture students in colleges and high schools, but others concerned with agricultural or urban erosion control may find it informative.

The Careless Technology. Edited by M. Taghi Farvar and John P. Milton. *1972. Doubleday and Company, Inc.* (100 Park Avenue, New York, New York 10017). 983 pp., illus. $25.

This book presents data and case studies, from 70 internationally known scientists, showing how the bulk of international development programs have neglected ecological imperatives and thereby caused grave environmental problems. The 50 case studies represent the record of an international conference on the subject.

The book explores the relationships between technology in the Third World nations and the ecological strains that progress creates. It challenges the idea that developing countries should be overhauled by wealthier countries.

Contributors to the book include Barry Commoner, F. Fraser Darling, George Borgstrom, Lynton K. Caldwell, and Gunnar Myrdal.

New publications

Distribution of the Duck Harvest in Canada and the United States. By Aelred D. Geis and F. Graham Cooch. *1972. U.S. Dept. of the Interior, Fish and Wildlife Service Spec. Scien. Rpt.—Wildlife 151. 11 pp. $0.25.* Presents the distribution of the kill by species in the United States and Canada for the years 1967-69 based on mail questionnaires and wing collection surveys.

Field and Seed Crops—Usual Planting and Harvesting Dates by States in Principal Producing Areas. By C. E. Burkhead, R. C. Max, R. B. Karnes, and E. Reid. *Rev. 1972. USDA Agr. Hbk. 283. 84 pp., illus. $0.75.* Contains information on the planting and harvesting dates for major field and seed crops. Dot maps show major areas of production, and isomaps show periods of planting and harvesting for specific crops.

Alaska Trees and Shrubs. By Leslie A. Viereck and Elbert L. Little, Jr. *1972. USDA Agr. Hbk. 410. 265 pp., illus. $3.25.* This handbook describes and illustrates 128 species in 54 genera and 19 plant families. It covers all of Alaska, however, this reference should be useful over a larger area in northwestern Canada, including the Yukon Territory, District of Mackenzie, and northwestern British Columbia. Most native woody plants of these adjacent areas are listed here.

Improved Spring Pastures, Cow-Calf Production, and Stocking Rate Carryover in the Northern Great Plains. By W. R. Houston and J. J. Urick. *1972. USDA Tech. Bull. 1451. 21 pp., illus. $0.20.* Gives the results of a grazing study that was conducted for 5 years in eastern Montana, comparing seeded pastures of crested wheatgrass-alfalfa and Russian wildrye-alfalfa with native range as spring pastures for Hereford breeding cows and calves. For the period 1964-68, the two seeded grass-alfalfa mixtures produced more forage with higher crude protein and with increased carrying capacity compared with that produced on the native range spring pasture.

Background on U.S. Agriculture. *USDA Leaflet 491. Rev. 1972.* Explains why modern farming and ranching, combined with a progressive system of marketing, processing, and merchandizing, is the nation's biggest industry.

Color Filmstrips and Slide Sets of the United States Department of Agriculture. *1972. USDA Misc. Pub. 1107. 17 pp., illus.* Lists and describes filmstrips and slide sets covering many phases of agriculture and home economics; includes those prepared by the Soil Conservation Service. Gives instructions on how to order. For information write to U.S. Dept. of Agriculture, Office of Information, Photography Division, Washington, D.C. 20250.

The Hired Farm Working Force of 1971, a Statistical Report. By Robert C. McElroy. *1972. USDA Agr. Econ. Rpt. 222. 30 pp., illus.* Presents information on the size and composition of the 1971 hired farm working force and on the employment and cash earnings from farm and nonfarm wagework obtained during the year.

Planning Natural Resource Development—an Introductory Guide. By George A. Pavelis. *1972. USDA Agr. Hbk. 431. 30 pp.* Describes and illustrates principles for making rational decisions on the scope, content, and scale of natural resource development programs; follows step-by-step phases of actual resource planning. This guide is mainly for public officials and others who do no actual planning but who make important decisions regarding projects.

Soil surveys

Seneca County, New York. By Frank Z. Hutton, Jr. *1972. 143 pp., illus.; maps 4 inches to the mile (1:15,840).*

Hardeman County, Texas. By K. T. Lofton, Earl R. Blakley, and Marvin L. Dixon. *1972. 84 pp., illus.; maps 3.17 inches to the mile (1:20,000).*

Lamar, Pike, and Upson Counties, Georgia. By Hugh T. Davis. *1972. 67 pp., illus.; maps 4 inches to the mile (1:15,840).*

Greenbrier County, West Virginia. By John L. Gorman, Leonard S. Newman, Woodrow W. Beverage, and William F. Hatfield. *1972. 95 pp., illus.; maps 3.17 inches to the mile (1:20,000).*

Meetings

September

10–13 American Fisheries Society, Little Rock, Ark.
10–16 International Union for the Conservation of Nature, Banff, Canada
14–15 International Association of Game, Fish and Conservation Commissioners, Hot Springs, Ark.
18–20 International Commission on National Parks (World Conference), Yellowstone National Park, Wyo.
26–28 American Society of Civil Engineers, Irrigation and Drainage Specialty Conference, Spokane, Wash.
28–29 American Forest Institute, Boston, Mass.

October

1–5 Society of American Foresters, Hot Springs, Ark.
2–5 Association of Conservation Engineers, Durham, N.H.
2–6 Wilderness Society, Adirondack Mountains, N.Y.
2–6 National Association of Recreation and Parks (Annual Congress), Anaheim, Calif.
4–20 World Forestry Conference, Buenos Aires, Argentina
5–13 Food and Agriculture Organization Panel on Land Evaluation for Rural Purposes, Wageninger, The Netherlands
7–11 American Institute of Planners, Boston, Mass.
7–11 American Bankers Association, Dallas, Tex.
8–11 Farm and Industrial Equipment Institute, Boca Raton, La.
8–13 Water Pollution Control Federation, Atlanta, Ga.
11–13 Future Farmers of America, Kansas City, Mo.
15–18 American Chamber of Commerce Executives, Las Vegas, Nev.
16–20 American Society of Civil Engineers, Houston, Tex.
16–20 Association of Engineering Geologists, Kansas City, Mo.
21–22 The Nature Conservancy, New Paltz, N.Y.
21–27 International Commission on National Parks (2d Part), Teton National Park, Wyo.
22–26 American Forestry Association (also, Nationwide Tree Planting Conference), New Orleans, La.
25–28 National Association of Biology Teachers, San Francisco, Calif.
26–28 National Council for Geographic Education, Milwaukee, Wis.
29–31 Sprinkler Irrigation Association, Monterey, Calif.
29–Nov. 3 Soil Science Society of America, Miami Beach, Fla.
29–Nov. 3 American Society of Agronomy, Miami Beach, Fla.
30–Nov. 3 American Water Resources Association, St. Louis, Mo.

November

12–15 National Association of State Universities and Land Grant Colleges, Washington, D.C.
12–17 National Association of State Departments of Agriculture, St. Croix, Virgin Islands
13–15 Geological Society of America, Minneapolis, Minn.
13–21 National Grange, Hartford, Conn.
15–17 National Water Resources Association, Salt Lake City, Utah
16–20 Adult Education Association of the USA, Minneapolis, Minn.
26–30 National League of Cities, Indianapolis, Ind.
27–29 National Land Use Policy Conference sponsored by Soil Conservation Society of America, Des Moines, Iowa
27–Dec. 1 American Association of State Highway Officials, Phoenix, Ariz.

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Recon . . .

The National Association of Conservation Districts is encouraging district supervisors to back the President's Environmental Merit Awards Program. The program, geared specifically to encourage students in elementary, junior, and senior high schools to become actively involved in environmental projects, will award certificates of achievement to students or groups achieving "a reasonable degree of success in understanding and/or acting upon environmental programs." Four areas of activity—educational achievement, environmental awareness action, community service, and public affairs—are covered by the program.

Interest-bearing Earth Bonds are being issued by an Arlington, Va., bank, and already a fund of $1.2 million has been accumulated, says *American Forests* magazine. The Virginia bank matches invested funds dollar for dollar and loans the money to businesses, industries, and civic organizations for use in fighting land, water, and air pollution.

San Francisco's new rapid-transit system for the Bay area goes into operation in the fall of 1972. It will be closely watched for effects on commuter patterns. Will auto use in the cities decline? If urban mass transit systems can be improved, the effects on land-use patterns, urban sprawl, pollution, and resource depletion could be significant.

Grazing hurts fish habitat. According to a report on the Montana Rock Creek flood plain, a natural, free-flowing stream channel with heavily vegetated banks shows a better fish population—in numbers and variety—than a stream channel flowing through a heavily overgrazed area. In terms of pounds per surface acre, overgrazing cut productivity by well over 50 percent.

Sediment changes the paths of streams and rivers in predictable ways, according to findings from a study of a 100-foot model channel by geologists at Colorado State University. At low slope and low sediment loads, the artificial channel remained straight. When the channel was graded so that elevation changed 0.002 foot per foot of length, the deepest part of the flow zig-zagged. At steeper slope, the channel bottom assumed a braided appearance. The "river" meandered when suspended sediment was added.—*Science News*, June 10, 1972.

For the birds. More waterfowl is the principal aim of the new Water Bank Program. The program will concentrate initially on the northern part of the central and Mississippi flyways, the birds' north-south migratory routes. Ten-year agreements are being signed with owners and operators of eligible wetlands to provide habitat and nesting areas. States participating are North Dakota, Minnesota, South Dakota, Montana, Wisconsin, California, Nebraska, Louisiana, Maine, Oregon, Mississippi, and Washington.

Not-so-instant landfill

Don Dinsmore, state conservationist in Maine, in comments about the article "Instant landfill—getting rid of trash for 20 cents a year" (SOIL CONSERVATION, May 1972), has pointed out that placing waste on excessively drained soils such as gravel pits can contribute to ground water contamination.

In some parts of the country, gravel pits are not safe sites for landfills because of soil materials, climate, or a high water table. The gravel pits mentioned in the article, however, are safe. Jim Eriksen, the district conservationist in Adams County, Nebraska, checked the soils at the site. He says that seepage is not a problem there because the landfill is on uplands where ground water is 90 to 110 feet below the surface.

Old gravel pits and stone quarries should be checked carefully before they are used as sanitary landfills. Soils that have a potential for ground water contamination from landfills can be sealed at the bottom in a way similar to that used for water impoundments.—Ed.